WE CLAIM:

1. A method for producing a non-human animal with a nuclear genome of interest, said method comprising the steps of:

   (a) providing an embryonic stem cell comprising a nucleus having a genome of interest of a non-human animal;
   (b) culturing an oocyte of the nonhuman animal so that it is a matured and activated oocyte or production of a zygote in vivo or in vitro;
   (c) enucleating the matured oocyte or zygote of step (b) to produce an enucleated recipient cell;
   (d) transferring the nucleus of step (a) to the enucleated recipient cell of step (c) to produce a nuclear transfer embryo;
   (e) culturing a nuclear transfer embryo of step (d) to produce an embryo of a 4-cell, 8-cell, 16-cell, compact morula or blastocyst stage of development;

2. The method of claim 1, further comprising, after step (e), implanting the nuclear transfer embryo of step (d or e) into a surrogate mother non-human animal;
whereby a non-human animal having a nuclear genome of interest is produced.

3. The method of claim 2, further comprising allowing the surrogate mother non-human animal to carry the non-human animal to term.

4. The method of claim 1, wherein the embryonic stem cell is a transgenic embryonic stem cell.

5. The method of claim 1, further comprising in step (a), genetically modifying the genome to comprise at least one heterologous DNA sequence.

6. The method of claim 1, wherein enucleating is by chemical, mechanical, UV, centrifugation or electromagnetic radiation means.

7. The method of claim 6, wherein the chemical enucleating is by contacting oocytess, wherein said oocutes are metaphase I oocytes, with etoposide supplemented medium followed by contacting with a combination of etoposide and cycloheximide.

8. The method of claim 6, wherein the mechanical enucleating is by micromanipulation to remove a germinal vesicle from an immature oocyte, a polar body and metaphase chromosomes from an in vivo or in vitro matured oocyte or a nucleus or pronucleus from a zygote (fertilized oocyte) or embryo produced in vivo or in vitro, or by oocyte bisection.

9. The method of claim 6, wherein the electromagnetic irradiation means of enucleating is by irradiation of oocytes with ultraviolet light.

10. The method of claim 9, wherein the ultraviolet light is 254 nm light and wherein the oocyte is a metaphase II oocyte.

11. The method of claim 6, wherein the mechanical enucleating is by density gradient centrifugation of oocytes.

12. The method of claim 6, wherein the electromagnetic enucleating is by laser irradiation.

13. The method of claim 1, wherein the nucleus is transferred to the enucleated recipient cell of step (c) by microinjection.

14. The method of claim 1, wherein the nucleus is transferred to the enucleated recipient cell of step (c) by electrofusion.

15. The method of claim 1, wherein the nucleus is transferred to the enucleated recipient cell of step (c) by contacting the donor cell and the enucleated recipient cell in the presence of a fusogenic agent.

16. The method of claim 15, wherein the fusogenic agent is an inactivated alpha virus.

17. The method of claim 15, wherein the fusogenic agent is inactivated Sendai virus.

18. The method of claim 15, wherein the fusogenic agent is polyethylene glycol.

19. The method of claim 1,wherein the oocyte is matured in vivo or in vitro and activated by cold shock, sham enucleation, electroactivation or electroactivation in combination with culture in the presence of cycloheximide.

20. The method of claim 1, wherein the nuclear transfer cell is porcine.

21. The method of claim 20, wherein the recipient cell is a Meishan, Yorkshire, Duroc, Yorkshire x Duroc, Duroc x Yorkshire, Pietrain x Meishan or a Duroc x Meishan cell.